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WHENCE CAME THE CULTIVATED STRAWBERRY?

BY L. H. BAILEY.[1]

The strawberry has been extensively cultivated only during the last century, and the earliest attempt at methodical amelioration extends back little more than two hundred years. The first horticultural variety of which we have any account is the Fressant, which dates from 1660. The wild species of strawberries are few, not numbering more than a dozen under the most liberal estimate, and they are well represented in the great herbaria or botanical centers of the world. Only a part of the wild types have been impressed into cultivation, and exact or very approximates dates can be given for the introduction of these cultivated species.

The strawberry, therefore, is a modern fruit, and its history and evolution would seem to possess no difficulties; and yet, despite all these facts, the botanical origin of the cultivated varieties is unknown, and we have the anomaly of a common fruit, appearing within little more than a century, which the botanist does not refer to any species. Here, then, is a most remarkable instance of the evolution of a new type of plant, taking place under our very eyes: whilst the botanists have written precise histories of its successive progresses, the reasons and methods of its development have escaped them. Perhaps there is no other plant which has so quickly obscured its own origin, or in which the speculative evolutionist can find stronger proof of the instability and elasticity of plants.

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[1] Lecture before the Author's class in Horticulture, Cornell Univ., Ithaca, New York.

I have said that the history of the strawberry is well known. There has been a careful record from the time Casper Bauhin and his contemporaries wrote their voluminous herbals. We cannot expect, as this time, therefore, to add anything to this long and consequential record. We must accept the history essentially as we find it. But it is possible that we shall be able to elucidate the evolution of the strawberry by the application of some of the principles of plant variation, the knowledge of which is now sufficient to warrant a constructive retrospect. At all events, if these laws cannot solve the general problem of the evolution of the strawberry, we must continue to remain in ignorance of its birth and departure. This inquiry will be all the more interesting, also, from the fact that the first monographer of the strawberries, Duchesne, in 1766, made an attempt to explain the origin of known species from the Alpine or Everbearing strawberries of Europe, and this essay, which has apparently not attracted the attention of modern philosophers, is one of the earliest efforts to account for the origin of organisms by means of a course of development.

It is necessary at the outset to eliminate the so-called European types of strawberries from our inquiry. These belong to three or four species native to Europe, chiefly to *Fragaria vesca* and *F. moschata* (*F. elatior*), and the botanical characters are sufficiently clear and uniform to allow of little doubt as to their origin. The first strawberries, like the Fressant, are of this type. These European types are mostly small and delicate fruits which are grown in France and some other parts of continental Europe, but which are little more than curiosities in England and America. It is the class of large American and English strawberries to which I now wish to direct attention, a type which, while grown in all temperate countries, seems to have first come to great prominence in England and which is the only market strawberry of America.

The first foreign strawberry to reach Europe was the common small species of eastern America, and which is known to botanists as *Fragaria Virginiana.* The first distinct record of it in Europe is in 1624, when it was mentioned by Jean and Vespasien Robin, gardeners to Louis XIII. For more than a century it appears not to have taken on any new or striking forms. It bore a small bright scarlet berry, with a distinct constriction or neck near the stem and slightly acid flesh. It was in no way very different, probably, from the common wild strawberry which we now pick in the fields. It was never greatly esteemed on the continent, but in England it found greater favor. Duchesne writes of it, in 1766, that "they still cultivate it in England with favor" (avec honneur). The original form of the Scarlet or Virginian strawberry was still highly esteemed in England less than three-quarters of a century ago, at which time Barnet[2] wrote enthusiastically of it. "This," [the Old Scarlet Strawberry] he says, "which has been an inhabitant of our gardens nearly, if not fully, two hundred years, was doubtless an original introduction from North America. It is singular that a kind of so much excellence, as to be at present scarcely surpassed by any of its class, should have been the first known. It continued in cultivation considerably more than half of the period of its existence as a garden fruit, without any variety having been produced of it, either by seed or by importation from America." Yet Barnet knew twenty-six good varieties of the species and describes them at length; and four of them seem to have come directly from America, probably from wild plants. A considerable progress had been made in the amelioration of the strawberry in England at the opening of the century, therefore, from the Virginian stock or foundation; but the varieties were much alike and contain little promise of the wonderful development in the strawberry varieties which we now enjoy.

About 1712, a second species of strawberry reached Europe. This is the *Fragaria Chiloensis,* brought from Chili to Marseilles by Capt. Frezier. It reached England in 1727. It is a stout, thick-leaved shaggy plant which bore a large globular or somewhat pointed late dark colored fruit. In a few places, particularly about Brest, in France, it came to be cultivated for its fruit; but in general it met small favor, particularly as the flowers were often imperfect and it did not fertilize itself. It did not seem to vary much under cultivation; at least, when Barnet wrote, about a century later, he knew only three varieties in England which he could refer to it, one of which he considered to be identical with the original plant as introduced by Frezier. The Chilian strawberry grows along the Pacific coast in both North and South America, and it has been introduced into our eastern gardens several times from wild sources; but it always soon disappears. There is little in the record of this species, therefore, of promise to the American horticulturist.

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[2] Trans. London Hort. Soc., vi, 152 (1824).

In the middle of the last century, a third strawberry appeared in Europe. Some writers place the date of its introduction with considerable exactness; but the fact is that no one knew just when or how it came. Phillip Miller described and figured it in 1760 as the Pine strawberry, in allusion to the pine-apple fragrance of its fruit. There were three opinions as to its origin at that time, some saying it came from Louisiana, others that it came from Virginia, while there was a report, originating in Holland, that it came from Surinam, which is now the coast of Dutch Guiana. None of these reports have been either confirmed or disproved, although Gay, in making extensive studies of the growth of strawberries, may be said to have effectually overturned the Surinam hypothesis in his remark that to find a strawberry growing at sea-level within five degrees of the equator, is like finding a palm in Iceland or Hammerfest![3] Duchesne, in his Natural History of Strawberries,[4] 1766, described a Pine-apple strawberry as *Fragaria ananassa*, and while he did not know its origin he argued that it must be a hybrid between the Chilian and Virginian species. The pine-apple strawberries of England and France were found to be different from each other upon comparison, although the differences were such as might arise within the limits of any species or type, and by the end of the century most botanists began to regard the two as variations of one stock. This general type of Pine strawberries, comprising the large-hulled type long represented by the Bath Scarlet and erected into a distinct species by Duchesne as *Fragaria calyculata,* has been collectively known for a century as *Fragaria grandiflora,* a name bestowed by Ehrhart in 1792, although this name, together with the English name Pine, is gradually passing from use. We may say that thus far there are three hypotheses as to the origin of the Pine strawberry—that it came from North America, from Guiana, and that it is a compound or hybrid of two other species; and we may add a fourth—that apparently accepted by Duhamel and DeCandolle and certainly by Gay—that it is a direct modification of the Chilian strawberry, and also a fifth, advanced by Decaisne[5] and accepted by others, that some, at least, of the varieties are products of the large, robust native form of our wild strawberry which is known as *Fragaria Virginiana* var. *Illinoensis.* I shall drop the Guianian origin as wholly untenable, and it will also be unprofitable to discuss directly the question of importation from North America, for we have nothing more than conjecture upon which to found any historical argument. I shall now endeavor to discover which of the remaining three hypotheses is best supported in the subsequent evolution of the plant itself: Is it a hybrid, a direct development of the Chilian species, or a form of the native variety *Illinoensis?*

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[3] Ann. Sci. Nat. 4th Ser. viii, 203 (1857).

[4] Histoire Naturelle des Fraisiers. Par M. Duchesne fils. Paris, 1766.

It is first necessary, however, to determine from what ancestral type our cultivated strawberry flora has sprung. Barnet, writing in 1824, referred all cultivated strawberries to seven groups or classes, three of which comprise the small European varieties which are outside this discussion. The remaining four classes comprise all the large-fruited types, and they are as follows: 1. The Scarlet or Virginian strawberries, with twenty-six varieties; 2. The Black strawberries or *Fragaria tincta* of Duchesne, with five varieties; 3. The Pines, with fifteen; 4. The True Chili strawberries, with three varieties. The Blacks and Pines are so nearly alike that they can be classed as one. Although the Pine class is the most recent of the lot, it had already varied into twenty forms, and, moreover, it contained the choice of the varieties. In this class is Keen's Seedling, which was then coming into prominence. This variety is the first conspicuous and signal contribution to commercial strawberry culture, and it marks an epoch amongst strawberries similar to that made by the Isabella amongst American grapes. It was grown from seeds of Keen's Imperial, which, in turn was raised from the White Carolina (known also as Large White Chili), which is regarded by Barnet as a Pine strawberry. Thomas Andrew Knight had made various interesting and successful crosses amongst the Scarlet or Virginian strawberries, but Keen's varieties so far excelled them, that Knight's productions were soon lost. From Keen's Seedling the present English strawberries have largely descended. The fruit of this remarkable strawberry was first shown in London in 1821. At this time there were apparently no important varieties in this country of American origin. Prince,[6] writing in 1828, enumerates thirty strawberries of American gardens, of which all, or all but one, are of foreign origin. The two important varieties, and the ones which supplied "the principal bulk of this fruit sold in the New York market" were Red Chili (referred by Barnet and by George Lindley[7] to the Pines) and Early Hudson, probably a variety of *Fragaria Virginiana.* Keen's berries are in the list, but these, according to Hovey and other later writers, did not thrive in America. As late as 1837, Hovey wrote[8] that "as yet the plants of nearly all the kinds in cultivation have been introduced from the English gardens, and are not suited to the severity of our climate." Mr. Hovey resolved to produce an American strawberry, and with a shrewdness which has rarely been equalled in the breeding of plants, he selected parents representing distinct ideals and the best adaptations to American conditions. Four varieties entered into a certain batch of crosses which he made. These were Keen's Seedling and Mulberry, both Pines, Melon, probably a Pine, and Methven Scarlet, a variety of the Virginian. From these crosses, two varieties were obtained,[9] one of which fruited in 1836. These were the Hovey and Boston Pine. Owing to the loss of labels, it is not certain which crosses gave these varieties, but Mr. Hovey was always confident that the Hovey sprung from Mulberry crossed by Keen's Seedling. The Hovey strawberry revolutionized strawberry growing in this country. It was to America what Keen's Seedling was to England; and it marks the second epoch in commercial strawberry culture. American varieties now appeared from year to year, and the greater part of them have come directly or indirectly from the Hovey and the Boston Pine. With the passing out of the Boston Pine and its immediate offspring, the term Pine has practically been lost to American strawberry literature, and the word is but a memory in the minds of the older men; but this is not because the class itself has disappeared, but, on the contrary, because it has become the dominant class and has driven out the Scarlet and all other competitors. The Hovey was a true Pine strawberry. Mr. Hovey grew it in his garden till the last, and it was my good fortune to secure a few plants of him shortly before his death. A plant is now before me as I write, and it has all the marks of the old Pine or Grandiflora type—the thick rounded dark leaves, stocky habit, stiff flower cluster, and large spreading calyx. All our commercial strawberries are Pines, and they compare well in botanical characters with the *Fragaria grandiflora* of the French gardens of a half century ago and with the famous Bath Scarlet and Pitmaston Black which were important Pines when Barnet wrote, specimens of all of which I have before me.

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[5] Jardin Fruitier du Museum, ix, under "Frasier d'Asa Gray."

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[6] A Short Treatise on Horticulture, 72. New York.

[7] A Guide to the Orchard and Kitchen Garden, 487. London, 1831.

[8] Mag. Hort. iii, 246.

Our strawberries, then, are lineal descendents of the old Pine class, known to botanists as *Fragaria ananassa* and *F. grandiflora.* Now the question recurs, what is the Pine? where did it come from? how did it originate? Three hypotheses, as I have said, have been advanced which an evolutionary review of the subject is capable of considering. Is it (1) a hybrid? (2) a direct development of the Chilian strawberry? or (3) a modified form of our big wild strawberry, *Fragaria Virginiana* var. *Illinoensis?*

[9] Mag. Hort. vi, 284 (1840). Fruits of America, i, 25, 27.

1. Is the Pine a hybrid? The only reason ever advanced for considering the Pine strawberry to be a hybrid was the supposed impossibility of accounting for its attributes upon any other hypothesis. The ideas of hybridity were indefinite in those times, and intermediateness of characters was often supposed to be enough—as it is, unfortunately, too often at the present day—to establish a hybrid origin. In considering this matter, two questions at once arise: (a) Does the Pine bear evidence of being a hybrid? (b) Would hybrid characters perpetuate themselves? I am wholly unable to find, either in herbarium specimens of the plants themselves or in the pictures of the plants, any distinct evidences of hybridity. The Pine strawberries differ from the Chilian chiefly in their greater size, less hairiness and better fruit, and sometimes by somewhat thinner leaves, although this thinness of foliage is usually more apparent than real, being due to the larger size and consequently greater flexibility of the leaf without any real diminution in substance; and I have seen as thin leaves in wild *Fragaria Chiloensis* as in garden berries. But greater size could scarcely be obtained from the smaller or or least more slender Virginian strawberry, and better sweet fruit would not likely result from the amalgamation of the Chilian with the little acid fruit of the other. On the other hand, there is not a character of the Virginian, so far as I know—save possibly some thinness of leaf—which appears in the Pine. The slender erect habit, smooth stems, profusion of early runners, comparatively simple and very weak-rayed trusses, the small calyx, the early, light-colored pitted fruit—none of these marks of the Virginian strawberry appear in the Pine. Again (b), it is now known that one of the most characteristic marks of hybrids is their variability when propagated from seeds; and yet Phillip Miller declares that the old Pine strawberry came true to seed! A hybrid left to itself almost invariably departs from its mongrel type and reverts to one or the other parent; and yet here is a supposed hybrid which has held its attributes intact for one hundred and fifty years, and has presented a sufficiently unbroken front to overcome all competi-

tors.[10] There is not only no evidence in favor of a hybrid origin, but there is very much against it; and I have no hesitation in discarding the hypothesis in favor of a simpler and more philosophical one.

2. Is the Pine strawberry a direct development of the Chili strawberry? Every feature of the Pine strawberry suggests the Chilian species. It differs chiefly in its greater size and sometimes by a slight loss of hairiness, but the relative sizes of the parts remain much the same as in the wild type. It is now well known that variation induced by changed conditions of life and augmented by subsequent selection, is the common and potent means of the evolution and amelioration of plants. Hybridization rarely effects a permanent evolution of types. To suppose that the Chilian strawberry should have varied into the type of the common strawberry is in accord with all the methods of nature. But there are two considerations which convince me beyond all question that cultivated strawberries belong to *Fragaria Chiloensis:* (a) Their botanical characters, which I shall discuss more fully in the next paragraph, (3), and (b) direct experiment. The experiment which I now record I consider to be of great importance. In 1890, I sent to Oregon for wild plants of *Fragaria Chiloensis.* The strawberries which I secured were short, stocky, thick-leaved, hairy, evergreen plants, at once distinguishable from the garden sorts. They were planted in a spot convenient for observation. I pressed one of the original plants and have taken specimens from time to time since. A specimen taken in May, 1891, is scarcely distinguishable from the wild plants set the year before, but specimens secured in July of the same year, show the longer stalkes and larger leaves of garden strawberries; while an average specimen taken in June, 1892, is indistinguishable from common cultivated varieties in botanical features! Here, then, is a change in two years, and not by seeds, either, but in the same original plants or their offshoots. This change, while remarkable, is still not unintelligible, for I have seen many cases of as great modification in plants

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[10] For a general discussion of the theory of hybridity, consult Bailey, Cross-Breeding and Hybridizing, 1892.

under cultivation; and the Chilian strawberry is widely variable in its wild state. Barnet has inadvertently recorded a distinct departure from the type of the Chilian plant, for he says that while this strawberry usually loses its leaves in winter, the varieties which have been bred from it keep their leaves. This change in my plants is due primarily, no doubt, to a greater amount of food, arising from the greater space which the plants are allowed to occupy; and it is possible that other environments may have assisted in the transformation. Having this experimental evidence, which so forcibly supplements direct botanical evidence and so well emphasizes the known laws of plant variation, I can no longer doubt that the garden strawberries are *Fragaria Chiloensis*, that the early botanists did not recognize the garden type as a departure from this species, and that this type has finally driven from cultivation the forms of *Fragaria Virginiana.* And I am glad to know that so great an authority as the elder DeCandolle accepted the opinion of Seringe (1825) that the Pine, Bath Scarlet and Black strawberries belong to the Chilian species, for the Prodromus makes Duchesne's *Fragaria ananassa, F. calyculata* and *F. tincta* all varieties of the Chilian plant. This was evidently the opinion of the Dutch plantsmen of the middle of the last century, also, for even before Duchesne described the Pine strawberry, these merchants sold it under the name of *Fragaria Chiloensis ananæformis,* indicating that it was regarded as a form of the Chilian species. And Duhamel, towards the close of the last century, said that the Pine could be raised from seeds of the Chilian. It is evident, however, that Seringe did not mean to say that all the large garden strawberries are offshoots of the Chilian species, for he has a variety *hybrida* of *Fragaria Virginiana,* which is a supposed compound of this species and the Pine. But if there was any hybridization in the early days, I am confident that it was only incidental and its effect was transitory. Our present strawberries are apparently direct and legitimate progeny of the Chilian species.

3. Is the Pine strawberry derived from *Fragaria Virginiana* var. *Illinoensis?* I confess that I have believed until recently that the garden strawberries are offspring of our native berry;

certainly I have always hoped that such would prove to be their origin. It is with much reluctance that I give up a pleasant and patriotic hypothesis; but everything is against it. I had long thought that the Pine strawberry of last century was only this robust form of our native species, a feeling to which the early conjectures of an American origin for the Pine lent color. But the Pine and the var. *Illinoensis* are so unlike in habit that they could not have been confounded. When the var. *Illinoensis* was really introduced into Europe in 1852 by Asa Gray, who secured it from the "wild and savage" country in western New York, it was thought to be so distinct from all other strawberries that it was made a new species, *Fragaria Grayana*, although it is scarcely different, except in greater size, from the common *Fragaria Virginiana*. If this plant possessed such eminent and variable qualities as to have made it the parent of our garden varieties, it would certainly have given indications of them somewhere in its wide and varied range. As it is, it has only now and then come into cultivation, when its behavior has been such that it has soon been discarded, as in the well known instance of the recent Crystal City. I have also tried to cultivate it, and its response, like the Crystal City, is mostly in leaves and runners, not in any permanent or striking modification. It is true that the botanical features of the garden strawberries and the var. *Illinoensis* are much alike, particularly in herbarium specimens, and for some time I was not able to separate them readily; but there are botanical characters, even aside from habit, which distinguish them. The garden strawberries are lower in habit, producing runners freely only after fruiting, with shorter petioles and more leaves springing from the crown of the plant, and the leaves are spreading—all of which are striking peculiarities of the Chilian plant,—while in the native plant the leaves stand up on long nearly perpendicular stalks and the runners are produced at flowering time; the leaflets are thick and firm in texture, broader than in *Illinoensis* and lacking the long narrow base of the native, with mostly rounder teeth, and they are particularly distinguished by the dark upper surface and the bluish-white under surface of the mature leaflets, the color of the leaflets in the native plant being light lively green, with little difference between the two surfaces. In these points of difference, too, the garden berries are characteristically like the Chilian. The truss or inflorescence is different in the two. In the garden berries, the truss stands more or less oblique or is often prostrate, and it is broken up into two or three strong, often unequal spreading arms from which the short and stout fruit-stems spring, and this is the distinctive habit of the Chilian species; in the *Illinoensis*, the truss is erect and it breaks up more regularly at its top and the inflorescence is less strongly spreading in proportion to the number of fruits it contains, and the fruit-stems are weak and slender and more or less drooping. The calyx is very large in the garden berries, a fact which Duchesne recorded in the name *Fragaria calyculata* which he applied to the large-hulled forms like the old Bath Scarlet, of which many are in cultivation at the present time. The fruit in *Illinoensis* is small and soft and bright scarlet, usually with a distinct neck and deeply embedded seeds; that of the garden berries still maintains the features of the Chilian berry in its large size, mostly globular-pointed form, dark color and seeds borne more nearly upon the surface. The garden berries are in every way much farther removed from the native berry than they are from the Chilian. From the latter they differ most widely, as I have said, in the taller growth and less hairiness;[11] but even in these features they do not resemble very closely the *Illinoensis*. It may be urged that all these differences might have come about under the influence of cultivation if *Illinoensis* itself had been the parent of the garden forms, to which I reply that direct experiment does not sustain the assumption, and that the excellent engravings of the early forms of the Pine strawberry show the same differences. It was the study of these pictures which first led me seriously to doubt the East-American origin of our strawberries. No one can examine the excellent colored pictures of Keen's berries,[12] and other early varieties, without being struck by the thick blue-bottomed leaves and wide-spreading arm-like trusses—indisputable marks of *Fragaria Chiloensis.*

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[11] It is often said that the fruit of the Chilian strawberry is erect and that the garden berries differ in a nodding fruit, but this is an error. While the fruit stems of the true Chilian are stiff, I have never known them to be erect, and in wild plants which I have grown, the fruit has the same drooping habit as in the garden berries. The Chilian species probably varies naturally in its fruiting habit, but I have yet to find an instance in which it holds its fruit upright.

Yet, despite these important botanical differences, the garden berries and the native *Illinoensis* are much alike, as I have said; and this similarity is really one of the arguments in support of a different geographical origin of the two. Similar climates or environments produce similar results, and when old berry fields are allowed to run wild, the plants do not revert to the type of the Chilian species, but are modified rather more in the direction of the indigenous plant. In the fall, when the flower trusses are gone and growth has ceased, it is sometimes almost impossible to distinguish between the leaves of spontaneous garden berries and wild *Illinoensis;* but the flower clusters the following spring will be likely to distinguish the two. As a matter of fact, garden berries probably do not often persist long when run wild. They are unable to contend with the grass and weeds, although *Illinoensis* may find in similar circumstances an acceptable foothold. It is not strange, therefore, that those individuals from the old cultivated beds which longest persist should be those nearest like the native berries, for such would fit most perfectly into the feral conditions.

There is only one conclusion, therefore, which fully satsifies all the demands of history, philosophy, and botanical evidence, and this is that the garden strawberries are a direct modification of the Chili strawberry. The initial variation occurred when species were thought to be more or less immutable, and, lacking exact historical evidence of introduction from a foreign country, hybridization was the most natural explanation of the appearance of the strange type. This modified type has driven from cultivation the Virginian berries which were earlier introduced into gardens; and the original type of the Chilian strawberry is little known, as it tends to quickly disappear through variation when impressed into cultivation. The strawberry is an instance of the evolution of a type of plant in less than fifty years, which is so distinct from all others that three species have been erected upon it, which was uniformly kept distinct from other species by the botanists who had occasion to know it best, and which appears to have been rarely specifically associated with the species from which it sprung.

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[12] See, for instance, the plate of Keen's Seedling in Trans. London Hort. Soc., v 261.